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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MEI CHEN

Appeal 2009-006803
Application No. 10/824,692[1]
Technology Center 2600

Before MARC S. HOFF, CAROLYN D. THOMAS,
and ELENI MANTIS MERCADER, Administrative Patent Judges.

HOFF, Administrative Patent Judge.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellant appeals under 35 U.S.C. § 134 from a Final Rejection of claims 1-55. We have jurisdiction under 35 U.S.C. § 6(b).

We reverse.

Appellant's invention concerns a method for enhancing image resolution. A respective motion map is computed for each paring of a

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[1] The real party in interest is Hewlett-Packard Development Company, L.P.

reference image and a respective image neighboring the reference image in a sequence of base images, each motion map including a set of motion vectors mapping reference image pixels to respective neighboring image pixels. Respective regions of a target image are assigned to motion classes based on the computed motion maps. Pixel values for the target image are computed based on corresponding pixel value contributions from the motion-compensated neighboring base images selected in accordance with the motion classes assigned to the target image regions. See Abstract.

Claim 1 is exemplary of the claims on appeal:

1. A machine-implemented image processing method, comprising: computing a respective motion map for each pairing of a reference image and a respective image neighboring the reference image in a sequence of base images, each motion map comprising a set of motion vectors mapping reference image pixels to respective neighboring image pixels;

assigning respective regions of a target image to motion classes based on the computed motion maps, the target image having a target resolution level and the base images having a base resolution level equal to or lower than the target resolution level; and computing pixel values for the target image based on corresponding pixel value contributions from the base images selected in accordance with the motion classes assigned to the target images regions.

The Examiner relies upon the following prior art in rejecting the claims on appeal:

Hanna	US 6,269,175 B1	Jul. 31, 2001
Kondo	US 6,307,560 B1	Oct. 23, 2001
Paniconi	US 7,088,773 B2	Aug. 8, 2006

P. Erhan Eren et. al., Robust, Object-Based High-Resolution Image Reconstruction from Low-Resolution Video, 6 IEEE TRANS. IMAGE PROC. 1446, 1446-51 (1997).

Richard R. Schultz et al., Subpixel Motion Estimation for Super-Resolution Image Sequence Enhancement, 9 J.VIS. COMM. & IMAGE REP. 38, 38-50 (1998).

Claims 1-3, 11, 16, 17, 28, 29, 32, 37, 42, 43, 46, and 51 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Schultz in view of Paniconi.

Claims 4, 5, 30, and 44 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Schultz in view of Paniconi and Hanna.

Claims 6, 12-15, 31, 33-36, 45, and 47-50 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Schultz in view of Paniconi and Eren.

Claims 7-10, 18-27, 38-41, and 52-55 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Schultz in view of Paniconi, Eren, and Kondo.

Throughout this decision, we make reference to the Appeal Brief ("App. Br.," filed May 29, 2008), the Reply Brief ("Reply Br.," filed December 10, 2008) and the Examiner's Answer ("Ans.," mailed July 24, 2008]) for their respective details.

ISSUES

The Examiner finds that the term "motion class" is broad enough to encompass a group of pixels that are assigned to a motion vector (Ans. 18). Applying that interpretation, the Examiner finds that Schultz and Paniconi both disclose assigning respective regions of a target image to motion classes based on the computed motion maps (Ans. 4, 6). Appellant argues that Schultz does not teach assigning motion vectors to regions, but only determining a motion map that contains motion vectors between matching

blocks of a pair of images (Reply Br. 3), and that Paniconi only classifies each moving object into a "class" rather than segregating regions of a target image into motion classes according to their different motion vector magnitudes (App. Br. 13).

Appellant's contentions present us with the following issue:

Does Schultz or Paniconi teach or suggest assigning respective regions of a target image to motion classes based on the computed motion maps, as independent claims 1, 28, and 42 require?

FINDINGS OF FACT

Appellant's Specification

1. Motion segmentation module 16 may classify pixel regions in each down-sampled motion map into a respective set of motion classes (e.g., a high motion class region 58, intermediate motion class regions 54, 56, and a low motion class region 52) (Spec. 10).

2. Motion vectors that are assigned to the intermediate motion class have magnitudes higher than motion vectors assigned to the low motion class and lower than motion vectors assigned to the high motion class (Spec. 11).

Schultz

3. Block matching is a popular approach for estimating motion vectors from image sequences. This method assumes that the motion field is uniform over compact blocks of pixels and that the motion can be modeled as displacements of these blocks. See § 3.2, p. 42.

Paniconi

4. Paniconi teaches that "local motion models typically indicate a moving object . . . . Each object can define a class. Each class can have a

code vector that defines the movement of the class to and from other frames" (col. 3, ll. 58-61).

PRINCIPLES OF LAW

Our reviewing court states that "the words of a claim 'are generally given their ordinary and customary meaning.'" Phillips v. AWH Corp., 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc)(internal citations omitted). The "ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application." Id. at 1313. The description in the Specification can limit the apparent breadth of a claim in two instances: (1) where the Specification reveals a special definition given to a claim term by the patentee that differs from the meaning it would otherwise possess; and (2), where the Specification reveals an intentional disclaimer, or disavowal, of claim scope by the inventor. Id. at 1316.

ANALYSIS

CLAIMS 1-3, 11, 16, 17, 28, 29, 32, 37, 42, 43, 46, AND 51

Claims 1, 28, and 42 are the pending independent claims in the case. Each independent claim recites assigning respective regions of a target image to motion classes based on the computed motion maps.

We begin by construing the claim phrase "motion class." Appellant's Specification discloses motion segmentation module 16, which classified pixel regions in to a respective set of motion classes, e.g., a high motion class region, intermediate motion class regions, and a low motion class region (FF 1). Motion vectors are assigned to a given motion class

according to their relative magnitudes: "motion vectors that are assigned to the intermediate motion class have magnitudes higher than motion vectors assigned to the low motion class and lower than motion vectors assigned to the high motion class" (FF 2). We, therefore, construe the claim phrase "motion class" as a set of motion vectors grouped according to their relative magnitudes.

Applying this claim construction, we agree with Appellant that neither Schultz nor Paniconi disclose or suggest assigning respective regions of a target image to motion classes based on the computed motion maps (App. Br. 11). We disagree with the Examiner's finding that "motion class" is broad enough to encompass (any) group of pixels that are assigned to a motion vector (Ans. 5, 18). We agree with Appellant that the block matching motion estimation process of Schultz (FF 3) only involves determining a motion map that contains motion vectors between matching blocks of a pair of images. Schultz does not teach assigning the motion vectors to regions (Reply Br. 3). Because of this deficiency, Schultz necessarily cannot teach assigning respective regions of a target image to motion classes based on computed motion maps.

Paniconi, likewise, does not assign respective regions of a target image to motion classes based on computed motion maps. Paniconi's motion segmentation process classifies local motion models, which typically indicate a moving object, into a number of classes, wherein each object can define a class (FF 4). We agree with Appellant that Paniconi thus assigns motion vectors to object classes, i.e., groups sharing common attributes representing different objects (App. Br. 13), whereas motion classes define

groups of motion vectors sharing common attributes representing different magnitudes.

Because the combination of Schultz and Paniconi fails to teach all of the limitations of independent claims 1, 28, and 42, we will not sustain the § 103 rejection of claims 1, 28, and 42, as well as claims 2, 3, 11, 16, 17, 29, 32, 37, 43, 46, and 51 dependent therefrom.[2]

CLAIMS 4-10, 12-15, 18-27, 30, 31, 33-36, 38-41, 44, 45, 47-50, AND 52-55

Each of these claims stands rejected under § 103 over the combination of Schultz, Paniconi, and one or more of Hanna, Eren, and Kondo. We have reviewed Hanna, Eren, and Kondo, and find that they do not supply the teaching of assigning respective regions of a target image to motion classes based on the computed motion maps which we found supra to be missing from Schultz and Paniconi.

Accordingly, we will not sustain the § 103 rejections of claims 4-10, 12-15, 18-27, 30, 31, 33-36, 38-41, 44, 45, 47-50, and 52-55, for the same reasons expressed supra with respect to parent claims 1, 28, and 42.

CONCLUSION

Neither Schultz nor Paniconi teach or suggest assigning respective regions of a target image to motion classes based on the computed motion maps, as independent claims 1, 28, and 42 require.

ORDER

The Examiner's rejection of claims 1-55 is reversed.

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[2] Because we find that the Examiner erred in setting forth a prima facie case of obviousness for independent claims 1, 28, and 42, we do not reach Appellant's arguments for the patentability of the dependent claims in the application.

REVERSED

gvw